

REMARKS

With this Amendment, Applicants amend claim 52 to correct an informality. No new matter is added. Therefore, claims 7, 10, 19, 21-25, 27, 29-33, 37-41, 43-44, 47, 51-52, 57 and 61-62 are all the claims pending in the application.

I. Objection to the Specification

The Examiner objected to the specification as failing to provide proper antecedent basis for the claimed subject matter as indicated on page 2 of the Office Action. Particularly, the Examiner alleged the “specification fails to disclose that the array type laser is also either a broad area type laser or a surface emission type laser.” Applicants submit that the amendments to the specification obviates the objection. Additionally, Applicants submit that no new matter has been added to the specification since the claims disclosed in the originally-filed application supports the amendments. Accordingly, the modification of the specification merely conforms the specification with the originally-filed claims. Applicants therefore respectfully request the Examiner to withdraw the objection to the specification.

II. Rejection under the Judicially Created Doctrine of Double Patenting

Claims 7, 10, 19, 21-25, 27, 29-33, 37-41, 43-44, 47, 51-52 and 61-62 stand rejected under the judicially created doctrine of obviousness-type double patenting as allegedly being unpatentable over claims 1-22 of Hayashi et al. (U.S. Patent No. 6,433,345; hereinafter “Hayashi”). Applicants submit herewith a Terminal Disclaimer to overcome the double patenting rejection of claims 7, 10, 19, 21-25, 27, 29-33, 37-41, 43-44, 47, 51-52 and 61-62.

III. Rejection of Claims 7, 47 & 57 Under 35 U.S.C. § 103(a) over AAPA in view of Tischler & Nakamura

Claims 7, 47 and 57 are rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over Applicants admitted prior art (AAPA) in view of Tischler et al. (U.S. Patent No. 5,679,152; hereinafter “Tischler”) and Nakamura et al. (U.S. Patent No. 6,900,465; hereinafter “Nakamura”). Regarding claim 7, Applicants submit that claim 7 is patentable because neither the AAPA, Tischler, Nakamura, nor any combination thereof teaches, suggests or provides the motivation for all of the limitations of claim 7. Accordingly, Applicants submit that the proposed combination of the AAPA, Tischler and Nakamura is deficient.

There simply *is no reasonable expectation* that the AAPA, Tischler and Nakamura may be successfully combined in the manner suggested by the Examiner. (*See* MPEP § 2143.02). Without citing to any particular column or line number the Examiner alleges that Nakamura discloses a semiconductor laser “wherein the active layer of the laser has InGaN/InGaN quantum cell structure” and the Examiner suggests that it would have been obvious to modify the AAPA, and the “GaN based laser” taught by Tischler to include an active layer of InGaN/InGaN quantum cell structure. (*See* pgs. 3-4 of the Office Action). However, the Tischler reference and the Nakamura reference specifically teach away from the suggested modification.

For instance, Nakamura is directed to a nitride semiconductor light-emitting device having an active layer of a single-quantum well structure or a multi-quantum well. Abstract. Column 2, lines 12-22 of Nakamura describes that conventional LED devices having an InGaN active layer suffer problems because the thickness of the active layer “is relatively thick, i.e., 0.1 to 0.2 μm ... which exceeds a critical thickness so that it was impossible ... [for a] conventional LED device to realize strong band-to-band emission,” thereby “failing to realize a laser

oscillation.” (emphasis added). According to Nakamura, a laser emitting diode (LED) having an active layer with a quantum well structure wherein the active layer is greatly thinned makes it possible to obtain a strong band-to-band emission which improves the emission output of the LED. Col. 2, lines 22-25. In order to achieve the strong band-to-band emission and improve the output of a light emitting device, Nakamura discloses an active layer 14 of a single-quantum well (SQW) or a multi-quantum well (MQW) structure formed of InGaN “having a thickness which is sufficiently thin.” Col. 7, lines 20-21; Col. 3, lines 38-41. When the active layer 14 has a (SQW) structure, Nakamura describes that the thickness of the InGaN layer is “100 angstroms [i.e., 0.010 μm] or less” to obtain a strong emission of inter-quantum level. Col. 7, lines 35-37 (emphasis added). When the active layer 14 has a (MQW) structure, Nakamura describes that the thickness of the InGaN layer is “70 angstroms [i.e., 0.007 μm] or less” so that the LED has a high emission output which indicates that the thickness is not more than the critical thickness of the InGaN active layer. Col. 7, lines 48-56 (emphasis added).

In contrast to the teachings of Nakamura, Tischler relates to *bulk* single crystal Ga*N articles having thick Ga*N layers. Col. 4, lines 26-27. Specifically, Tischler teaches that the Ga*N single crystal substrate disclosed therein are grown with “thick Ga*N layers” in order to reduce defects due to dislocations arising from the lattice mismatch. According to the disclosure of Tischler, the Ga*N layers are grown to a desired thickness of “1-1000 μm, preferably 100-300 μm.” Col. 5, lines 58-60 (emphasis added).

Given that Nakamura discloses an InGaN active layer 14 with a SQW or MQW structure requiring a thin layer and since Tischler requires a thick Ga*N layer, the references themselves expressly teach away from the suggested modification.

As such, the proposed modification is deficient and the cited combination of references does not teach and is incapable of suggesting a fluorescence observing apparatus comprising, *inter alia*, a light source for emitting excitation light, wherein a GaN-based semiconductor laser is employed as said light source, wherein an active layer of said semiconductor laser has InGaN/InGaN quantum cell structure, as claimed. For at least the above reasons, Applicants respectfully request the Examiner to reconsider and withdraw the § 103(a) rejection of claim 7.

Regarding claims 10, 23, 31, 39, 47 and 57 which depend from claim 7, Applicants submit that claims 10, 23, 31, 39, 47 and 57 are patentable *at least* for the reasons submitted for claim 7.

IV. Rejection of Claim 10 Under 35 U.S.C. § 103(a) over AAPA in view of Tischler, Nakamura & Studholme

Claim 10 stands rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over AAPA in view of Tischler and Nakamura and further in view of Studholme et al. (U.S. Patent No. 5,323,008; hereinafter “Studholme”). Applicants submit that claim 10, which depends from claim 7, is patentable for at least the reasons submitted for claim 7 and because Studholme does not make up for the deficiencies of the AAPA, Tischler, and Nakamura.

With further regard to claim 10, Applicants submit that the cited combination of references fails to teach, suggest or provide the motivation for a fluorescence observing apparatus, wherein said semiconductor laser is caused to output pulsed excitation light having a peak value greater than or equal to a continuous maximum output value of said semiconductor laser by a pulse-injecting current, as claimed. In rejecting claim 10, the Examiner relies on column 8, lines 27-60 of Studholme as teaching the features of claim 10. To the contrary, the

Examiner's rationale to combine the cited references in the manner suggested is deficient and the cited portion of Studholme in combination with Tischler and Nakumura does not teach or suggest the features of claim 10.

On page 4 of the Office Action, the Examiner suggests that modifying the lasers disclosed by Tischler and Nakumura such that the lasers can be driven as disclosed by Studholme would have been obvious. Applicants respectfully disagree. In contrast to the requirements of claim 10, Studholme relates generally to a fluorescence detection system utilizing a relatively high powered, high repetition rate light source to increase speed, sensitivity, and accuracy in the detection of a fluorophore. Col. 3, lines 35-38. In order to meet these requirements, Studholme discloses a laser diode employed as a light source (Col. 5, lines 31-32) because it is capable of handling high power such as 100 mW and may be pulsed at relatively high repetition rates such as 10 MHz. Col. 3, lines 47-50 & Col. 5, lines 32-39. Several variables and constraints affect the laser diode taught by Studholme (e.g. temperature, timing). As previously pointed out in the Amendment dated October 12, 2004, Studholme advocates selecting dyes with a long excitation wavelength in the red and infrared wavelength regions to achieve a higher sensitivity. Col. 2, lines 28-31 & Col. 12, lines 44-47. Column 5, lines 40-50 of Studholme describes that the laser diode disclosed therein produces poor sensitivity when used to emit light which has a wavelength belonging to a short wavelength region from ultraviolet rays to visible light. As such, Studholme is unable to achieve adequate sensitivity without using laser diodes in discrete output wavelengths compatible with fluorescent dyes at the red or longer wavelength.

In contrast to the laser diode of Studholme, which is dependent on the long wavelengths of the contemplated flourescable dyes, Tischler, merely describes a GaN laser emitting in the blue to ultraviolet range. Even assuming *arguendo* that the driving parameters of Studholme could be utilized with the laser taught by Tischler, there is *no reasonable expectation of success* given that Tischler teaches emission of light in the “blue to ultraviolet wavelength [regions],” (Col. 9, lines 28-29 of Tishcler) which is outside the range contemplated to excite the fluorophores of Studholme (i.e., the red and infrared wavelength regions). (*See* MPEP § 2143.02). In other words, the emission wavelengths of the laser diode taught by Studholme are incompatible with the wavelength of the laser disclosed by Tischler. There simply is no teaching or suggestion in any of the references that the lasers of Tischler and Nakumura may be modified in the manner suggested by the Examiner. Applicants also submit that the Examiner has combined a large number of references to teach the elements of claim 10, which serves as evidence of unobviousness.. In view of the foregoing, Applicants respectfully request the Examiner to reconsider and withdraw the § 103(a) rejection of claim 10 for this additional reason.

V. Rejection of Claims 23 & 39 Under 35 U.S.C. § 103(a) over AAPA in view of Tischler, Nakamura & Okazaki

Claims 23 and 39 are rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over AAPA in view of Tischler and Nakamura and further in view of Okazaki (U.S. Patent No. 6,125,132; hereinafter “Okazaki”). Applicants respectfully submit that Okazaki is not available as a reference and request that the Examiner reconsider and withdraw the rejection based, in part, on Okazaki in view of the following remarks.

Okazaki is only available as a reference as of its filing date under 35 U.S.C. § 102(e).

The statute, 35 U.S.C. § 103(c), provides that:

Subject matter developed by another person, which qualifies as prior art only under one or more of subsections (e), (f), and (g) of section 102 of this title, shall not preclude patentability under [§ 103] where the subject matter and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person.

Since the present invention and Okazaki were commonly owned at the time of the making of the present invention, Okazaki is not available as prior art under § 103(c). Fuji Photo Film Co., Ltd. is the assignee of Okazaki (see enclosed copy of "Patent Assignment Abstract of Title"; Reel/Frame number is 009140/0169) by virtue of an Assignment from all of the inventors thereof and is also the assignee of the above-captioned U.S. Application No. 09/611,229 by virtue of an Assignment from all of the inventors thereof executed on June 28, 2000 and filed with the USPTO on July 6, 2000 (copy enclosed; Reel/Frame number is 010951/0466).

The undersigned hereby represents that Okazaki and the claimed invention were, at the time the invention of the instant application was made, owned or subject to an obligation of assignment to Fuji Photo Film Co., Ltd. In view of the above, it is respectfully submitted that Okazaki is not available as art under 35 U.S.C. § 103.¹

Additionally, Applicants submit that claims 23 and 39, which depend from claim 7, are patentable for at least the reasons submitted for claim 7 and because Okazaki does not make up for the deficiencies of the AAPA, Tischler, and Nakamura. Based on at least the foregoing

¹ Applicants note JP09-110554 was published January 22, 1999.

reasons, Applicants respectfully request the Examiner to reconsider and withdraw the § 103(a) rejection of claims 23 and 39.

VI. Rejection of Claim 31 Under 35 U.S.C. § 103(a) over AAPA in view of Tischler, Nakamura & Sugawara

Claim 31 stands rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over AAPA in view of Tischler and Nakamura and further in view of Sugawara et al. (U.S. Patent No. 6,232,137; hereinafter “Sugawara”). Applicants submit that claim 31, which depends from claim 7, is patentable for at least the reasons submitted for claim 7 and because Sugawara does not make up for the deficiencies of the AAPA, Tischler, and Nakamura. Applicants therefore respectfully request the Examiner to reconsider and withdraw the § 103(a) rejection of claim 31.

VII. Rejection of Claims 19, 21-22, 37-38, 51 & 61 Under 35 U.S.C. § 103(a) over AAPA in view of Tischler & Okazaki

Claims 19, 21-22, 37-38, 51 and 61 stand rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over AAPA in view of Tischler and Okazaki. In view of the common obligation of assignment between Okazaki and the present application, Applicants submit that Okazaki is not available as prior art under 35 U.S.C. § 103(c), as discussed above with respect to claims 23 and 29. Accordingly, Applicants respectfully request the Examiner to reconsider and withdraw the 35 U.S.C. § 103(a) rejection of claims 19, 21-22, 37-38, 51 and 61. With further regard to claims 21 and 37, Applicants respectfully request the Examiner to provide prior art

which substantiates the assertion that it is well known in the art to “use pulsed excitation” in combination with the claimed elements so as to render claims 21 and 37 obvious.²

Concerning claims 43, 51 and 61, Applicants submit that claims 43, 51 and 61 are patentable at least by virtue of their dependency from independent claim 19.

VIII. Rejection of Claim 43 Under 35 U.S.C. § 103(a) over AAPA in view of Tischler, Okazaki & Osinski

Claim 43 stands rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over AAPA in view of Tischler and Okazaki and further in view of Osinski et al. (U.S. Patent No. 6,421,363; hereinafter “Osinski”). In view of the common obligation of assignment, Applicant submits that Okazaki is not available as a reference under 35 U.S.C. § 103(c). Applicants therefore respectfully request the Examiner to reconsider and withdraw the § 103(a) rejection of claim 43.

IX. Rejection of Claims 24-25 & 40-41 Under 35 U.S.C. § 103(a) over AAPA in view of Tischler, Studholme & Okazaki

Claims 24-25 and 40-41 stand rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over AAPA in view of Tischler, Studholme and Okazaki. In view of the common obligation of assignment, Applicants submit that Okazaki is not available as a reference and respectfully requests the Examiner to reconsider and withdraw the § 103(a) rejection of claims 24-25 and 40-41 for at least this reason.

² (See MPEP 2144.03 §§ E explaining that “[i]t is never appropriate to rely solely on common knowledge in the art without evidentiary support in the record as the principal evidence upon which a rejection [is] based.”)

Additionally, Applicants submit that the combination of the AAPA, Tischler and Studholme do not teach the features of claims 24 and 40. To be precise, Applicants submit that since claims 24 and 40 contain features that are similar, *though not necessarily coextensive with*, the features recited in claims 7 and 10, claims 24 and 40 are patentable for reasons analogous to those submitted for claims 7 and 10.

Applicants note that the Examiner applied Okazaki only for its teaching relating to a broad area type semiconductor laser and an array type semiconductor. (*See* pg. 6 of the Office Action). As such, Okazaki does not compensate for the deficiencies of the AAPA, Tischler and Studholme. In addition, Applicants request the Examiner to provide prior art which substantiates the assertion that it is well known to “use pulsed excitation” in combination with the claimed elements so as to render claims 24 and 40 obvious. (*See* MPEP 2144.03 §§ E explaining that “[i]t is *never appropriate* to rely solely on common knowledge in the art without evidentiary support in the record as the principal evidence upon which a rejection [is] based.”) (emphasis added). In view of the above, Applicants respectfully request the Examiner to reconsider and withdraw the § 103(a) rejection of claims 24 and 40 for this additional reason.

Given that claims 25 and 41 contain features that are similar, though not necessarily coextensive, to the features recited in claim 24, Applicants submit that claims 25 and 41 are patentable for at least the reasons analogous to those submitted for claim 24. Additionally, there is no disclosure or teaching in Studholme and the Examiner cites to none, suggesting the requirement for wherein said semiconductor laser is driven so that an integrated value of pulse oscillation output values of said semiconductor laser per unit time becomes less than or equal to an integrated value of the continuous maximum output values of said semiconductor laser per

unit time, as claimed. Nowhere in Studholme or any of the cited references is there any teaching or suggestion relating to an integrated value of pulse oscillation output values. Accordingly, Applicants respectfully request the Examiner to reconsider and withdraw the § 103(a) rejection of claims 25 and 41 for this additional reason.

X. Rejection of Claims 27, 29-30, 52 & 62 Under 35 U.S.C. § 103(a) over AAPA in view of Tischler & Sugawara

Claims 27, 29-30, 52 and 62 stand rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over AAPA in view of Tischler and Sugawara. Applicants submit that claim 27 is patentable because neither the AAPA, Tischler, Sugawara nor any combination thereof teaches, suggests or provides the motivation for all of the features of claim 27. Accordingly, Applicants submit that the proposed combination is deficient for at least the following reasons.

As a preliminary matter, the Examiner's general reliance on Sugawara in combination with the AAPA and Tischler simply does not teach and is incapable of suggesting a GaN based semiconductor laser is employed as an excitation light source, wherein said semiconductor laser is a surface emission type semiconductor laser, as described by claim 27.

Sugawara relates to a multi-layered semiconductor light emitting element designed to minimize thermal deterioration of an active layer 903 i.e., a nitride compound layer so that the multi-layered structures exhibit excellent crystallographic properties. Abstract; Col. 4 lines 5-6; Col. 8, lines 39-40. As shown in FIG. 10 of Sugawara, the surface emitting light element 900 disclosed therein has the multi-layer structure to achieve the aforementioned objectives. On the other hand, Tischler relates to a single layer bulk "crystal Ga*N substrate for the fabrication of microelectronic structures thereon." Col. 2, lines 65-67; Col. 3, line 1. There is no expressed or

implied disclosure in Tischler and the Examiner cites to none suggesting that single layer Ga*N substrate may be used in a multi-layered semiconductor surface emitting light element (e.g. 900) to minimize thermal deterioration of an active layer, as taught by Sugawara. The Examiner has not provided motivation known in the art to modify the combination of the AAPA, Tischler and Sugawara in the manner suggested by the Examiner. The only teaching comes from Applicants' own disclosure, which is not proper according to *In re Vaeck*, 20 USPQ2d 1438, 1442 (Fed. Cir. 1991).

In view of the above, Applicants submit that the Examiner's proposed modification is deficient and does not teach all of the features of claim 27. Applicants therefore respectfully request the Examiner to reconsider and withdraw the § 103(a) rejection of claim 27.

Regarding claims 44, 52 and 62 which depend from claim 27, Applicants submit that claims 44, 52 and 62 are patentable at least by virtue of their dependency from independent claim 27.

Since claim 29 contains features that are similar, though not necessarily coextensive, to the features recited in claim 27, Applicants submit that claim 29 is patentable for reasons analogous to those submitted for claim 27. Additionally, Applicants respectfully request the Examiner to provide prior art which substantiates the assertion that “[i]t is well known in the art to use pulsed excitation light” in combination with the elements of claim 29 so as to render claim 29 obvious.

Given that claim 30 contains features that are similar, though not necessarily coextensive, to the features recited in claim 27, Applicants submit that claim 30 is patentable for reasons analogous to those submitted for claim 27.

XI. Rejection of Claim 44 Under 35 U.S.C. § 103(a) over AAPA in view of Tischler, Sugawara & Nakayama

Claim 44 stands rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over AAPA in view of Tischler and Sugawara and further in view of Nakayama et al. (U.S. Patent No. 6,590,917; hereinafter “Nakayama”). Applicant submits that claim 44, which depends from claim 27, is patentable for *at least* the reasons submitted for claim 27 and because Nakayama does not make up for the deficiencies of the AAPA, Tischler and Sugawara. Applicants therefore respectfully request the Examiner to reconsider and withdraw the § 103(a) rejection of claim 44.

XII. Rejection of Claims 32-33 Under 35 U.S.C. § 103(a) over AAPA in view of Tischler, Studholme & Sugawara

Claims 32-33 stand rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over AAPA in view of Tischler, Studholme and Sugawara. Since claims 32-33 contain features that are similar, though not necessarily coextensive with, the features recited in claims 24-25, Applicants submits that claims 32-33 are patentable at least for the reasons submitted for claims 24-25 and because Sugawara fails to make up for the deficiencies of the AAPA, Tischler and Studholme. Additionally, as discussed above with respect to claim 27, there is no motivation known in the art to modify the combination of the AAPA, Tischler and Sugawara in the manner suggested in order to arrive at the features of claims 32-33. Accordingly, Applicants respectfully request the Examiner to reconsider and withdraw the § 103(a) rejection of claims 32-33.

XIII. Conclusion

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the

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Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

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